

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	ET Docket 13-84
Reassessment of Federal Communications)	
Commission Radiofrequency Exposure Limits)	
and Policies)	
 Proposed Changes in the Commission's Rules)	
Regarding Human Exposure to Radiofrequency)	ET Docket 03-137
Electromagnetic Fields)	

To: The Commission

Reply Comments of Hammett & Edison, Inc., Consulting Engineers

1. This filing is in response to comments filed to the March 29, 2013, First Report and Order (First R&O), Further Notice of Proposed Rulemaking (FNPRM), and Notice of Inquiry (NOI) regarding limits for human exposure to radiofrequency energy, ET Docket 13-84. That document was published in the Federal Register on June 4, 2013, thus establishing a reply comment deadline of November 1, 2013.
2. Hammett & Edison is qualified to comment on this matter. The firm has been active in the field of radio frequency (RF) exposure for more than thirty years. Its engineers continue to serve on the International Committee on Electromagnetic Safety (ICES), and have published a book on the subject.¹ Furthermore, the firm was a named contributor to the 1985 and 1997 editions of OET Bulletin No. 65. We appreciate the opportunity to provide our reply comments on this proceeding, and we restrict our comments to those for which our firm's 50 years of experience with radio transmitting facilities lends us expertise.

I. Broad Consensus to Adopt the BR in IEEE C95.1-2005

3. We have read the comments of CDE, CTIA, FWCC, ICES, Motorola, NAB, Nokia, PCIA, Richard Tell, TIA, Verizon, and the Wi-Fi Alliance; we consider to be stakeholder parties in the matter of how the United States treats human exposure to radio frequency energy. We see a broad consensus for the FCC to retain the Basic Restriction (BR) based on a specific absorption rate (SAR) of 4 watts/kg, with a ten-fold safety factor for occupational exposures, and an additional five-fold safety factor for public exposures; that is, 0.4 watts/kg for occupational exposures and 0.08 watts/kg

¹ William F. Hammett, Radio Frequency Radiation: Issues & Standards, McGraw-Hill, 1997.



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for public exposures. We see a broad consensus for harmonizing peak exposures from 1.6 W/kg over 1 gram of tissue to the levels shown in Table 6 of IEEE C95.1-2005, 2.0 W/kg over 10 grams of tissue. We note that consensus applies to the adoption just of the BR limits in IEEE C95.1-2005, and not of the standard in its entirety.

II. No Need to Adopt Contact Current Limits

4. We disagree with comments concluding that the FCC needs to adopt limits for contact currents. We believe that induced RF currents caused by new construction near AM stations, typically involving cranes, are best handled on a case-by-case basis, rather than creating maps showing the 10 volt/meter contour of every AM station in the United States. Further, for directional AM stations, we would expect that in many cases the distance to that contour would be in the near field of the array; that is, too close to each radiating tower for the array pattern to have fully formed. Therefore, to accurately predict the 10 volt/meter contour, each tower of the array would need to be modeled as an individual element, with the appropriate amount of power applied.

5. Since cranes used for new construction would not be operated by the general public, we believe that it would be preferable for the Commission to continue to work with the Occupational Health and Safety Administration (OSHA) to alert crane operators that operation near AM stations may require special protocols to ensure that excessive contact currents are not created.

6. A problem with the Commission adopting a contact current limit is that this means using impractical, full-size mannequins or, alternatively, the current induced in the person making the measurement; that is, the measurement is then a function of the specific person in the field. In order to ensure that Commission field engineers attempting to measure contact currents to verify compliance do not obtain greater than the allowable current, it will be necessary to establish larger preclusion distances that provide a conservative factor for the person being used for the contact current measurement. The type of shoes being worn, and whether the shoes and surface are wet or dry, could also impact the magnitude of the measured contact current. An E-field or H-field measurement should not be a function of the person making the measurement, if properly done.

7. It was these troubling measurement and enforcement issues that caused the Commission not to adopt contact current limits in the ET Docket 93-62 rulemaking. We believe that is still the case, and therefore urge that the Commission not adopt contact current limits.

III. Adopt Proposed MPE-Based Exemption from Routine Evaluation

8. Like CDE, we appreciate the Commission's attempts to clarify the difference between "exemption" and "exclusion." "Exemption" means below an RF trigger level, whereas "exclusion"



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means other environmental factors are involved. We agree with FWCC that the proposal to base exemption on a maximum permissible exposure (MPE), using a Ambient Exposure Quotient (AEQ), would be burdensome. We presume that measurements must be conducted to establish AEQ, and we wonder why, in that case, one would not simply measure the actual exposure levels for all the sources; that would allow a direct determination of compliance with the FCC exposure limits, addressing Motorola Solution's concern about "triple counting."

9. Certainly, the present height-and-power thresholds for routine exemption from evaluation are demonstrably inadequate, and we appreciate the Commission's effort to adopt a better criteria. We recommend, however, that such criteria be assessed by calculation, rather than measurement.

IV. Transient Exposures

10. We agree with Mr. Tell that the standard is based on time-averaged exposure levels and that there is no basis for limiting the transient exposure levels to the peak occupational limit. Prohibiting exposures in excess of occupational at any time means using only peak values and not spatially averaged values. There is a reasonable basis for both time-averaging and spatially averaging measured values; so long as the averaging is properly done and documented, there should be no flat prohibition in doing so, regardless of whether public or occupational exposures are involved.

11. Additionally, we agree with NAB that the Commission's "clarification" on transient exposure adds confusion and complication. In paragraphs 3 and 65 of the R&O, it is noted that transient exposure applies for "non-workers exposed at levels up to occupational limits" and that "occupational/controlled limits apply." This is at variance with the FNPRM, which in paragraph 177 notes that transient individuals "should not be exposed in excess of the general population limit considering averaging time, and not in excess of the occupational limit for continuous exposure at any time." It is the "at any time" restriction that is problematic; it makes the Commission's interpretation of transient exposure limits in the FNPRM more restrictive than the public exposure limits.

12. That is, a member of the "general public" could be exposed to peak levels in excess of the occupational limit, so long as the time-averaged level is below the public limit, while the FNPRM says that a "transient" individual, somehow deserving of a more restrictive limit, could not be exposed to peak levels in excess of the occupational limit, even if the time-averaged level is below the public limit. Therefore, the "at any time" restriction should be removed.

V. Additional Signage Requirements

13. We agree with Verizon that the new signage requirement would be burdensome. Requiring carriers to post signs for up to four categories may result in over-signage and confusion, especially if



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there are multiple carriers on the rooftop. To at least partially alleviate this concern we recommend that the FCC remove the Category 4 requirement (exceeds 10X occupational limit). The enforceable limits are public and occupational; 10X occupational is not an MPE limit in either the FCC or the IEEE standards and should not be enforceable or require its own type of warning sign.

14. Positive access control should be required for Category 2 (occupational) exposures, although the present Commission policy of signage being sufficient for above-Category 1 (public) exposures at remote sites not likely to be visited by the public should remain acceptable. That is, do not adopt a blanket access restriction for above-Category 1 exposures in all cases.

15. To ensure that the extent of public or occupational levels for rooftop-mounted antennas can be readily and easily determined by workers requiring access to a rooftop, we suggest that a clearly visible demarcation, such as paint stripes or indicative markings, be used. Such demarcations would clearly identify the entire area(s) in which occupational and/or public exposure limits are reached, avoiding the need for numerous signs to be placed at those locations. Workers could be instructed to look for such markings and to observe the appropriate protocol when working in those areas.

VII. Training

16. While we do not go so far as PCIA and suggest that the Commission offer RF exposure training, we do agree that all training should be consistent with the benchmark suggested at paragraph 195 of the NPRM, namely, Annex A of IEEE C95.7-2005. However, requiring that training include all of the Annex A subjects would be too extensive. For example, we do not believe that roofers and other non-RF technical maintenance staff need to know about the different types of RF generators, transmission lines, antennas and wave propagation.

17. We agree with PCIA that a two-year implementation period for new training requirements should be allowed. The Commission should clarify whether an approved training program must include a substantive testing element, and whether the qualification should be renewed at regular intervals. We recommend both.

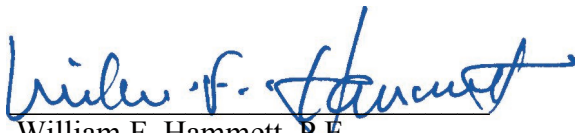
VIII. Spatial Averaging

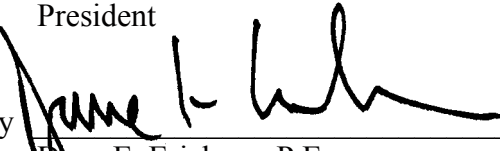
18. We share Mr. Tell's concern that while paragraph 221 of the NOI asked for comments regarding spatially averaged measurements, the Appendix H portion of the NOI appears to already apply a stricter interpretation. Specifically, at the bottom of page 197, the Commission "cautions" that for measurements close to transmitting antennas, the spatial peak (as opposed to the spatial average) should be used. We agree with Mr. Tell that there is no convenient way to know when the localized SAR limit has been exceeded. Further, pursuant to FCC Rules Section 2.1093 we note that the

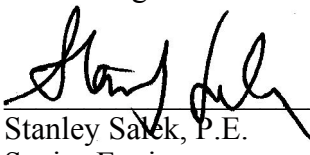
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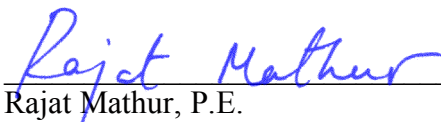
localized SAR limits apply to portable devices not to fixed facilities. Using the peak value to determine compliance, as suggested by the Commission, is overly conservative. We urge that in a supplement to OET Bulletin 65 and/or in a KDB, the Commission adopt power density MPE values for localized exposure near fixed facilities similar to the values in Section 4.6 of IEEE C95.1-2005; that is, up to 20 times higher than the most restrictive spatially averaged limit. This practice would enable determination of compliance with both the spatially averaged limits and the localized limits.

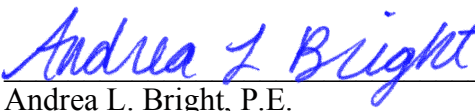
Respectfully submitted,

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